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THEORETICAL AND METHODOLOGICAL ASPECTS OF INNOVATIVE ECONOMIC DEVELOPMENT

CLUSTERS IN THE INSTITUTIONAL PERSPECTIVE: ON THE THEORY AND METHODOLOGY OF LOCAL SOCIOECONOMIC DEVELOPMENT

T. R. Gareev[*]

This article addresses the problem of definition and identification of clusters as localised mesoeconomic systems with fuzzy boundaries that stimulate the development of these systems. The author analyses the influence of the inductive approach to the formation of cluster theory and juxtaposes different typologies of clusters and other types of localised economic systems. The article offers an overview of the existing methodological approaches to the problem of cluster identification and emphasises the major role of institutional dimension in the identification (and functioning) of clusters, especially in comparison to cluster formation theory based on the technological connection of adjacent units. The author comes to a conclusion that, without the inclusion of institutional factors, alongside localising and technological ones (demonstrated through different variables), it is virtually impossible to develop an independent cluster theory, different from the general agglomeration theory. For the first time, a hierarchy of institutions affecting the formation of local economic systems is considered against the background of the identification of institutional levels, whose full development makes it possible to speak of the formation of clusters as most successful mesoeconomic systems. At the same time, the author emphasises that, in economies gravitating towards the market type of organisation, the development of mesoeconomic systems is closely connected to competition for innovative rent. The article outlines the methodology for cluster studies, which makes it possible to consider such relatively new to the regional science phenomena as innovative and "transborder" clusters.

***Key words*:** clusters, mesoeconomics, mesoeconomic system, regional development

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Introduction

It has become common practice to begin any talk on economic clusters with admitting that there is no adequate, universally accepted definition of the cluster. In spite of that, the copious literature on cluster approach is expanding [32—45].

L. Markov and M. Yagoltser [7] give a comprehensive overview of overseas research containing substantiated definitions of the cluster. The reviews of cluster typologies and methodology of cluster identification can be found in [4; 10; 13].

Regarding cluster formation in Russia, a chapter in the CEMI RAS monograph is worth mentioning. It is devoted to the development of meso-economic systems [8, pp. 687—700], and surmises that the necessity to use the cluster approach is widely admitted and discussed; however, methodologies of defining clusters on the regional level are non-existent.

This article addresses several issues hampering the formation of the cluster theory; it also substantiates a research methodology for innovative clusters with transborder elements [38].

We suggest that such a methodology is to meet the conditions as follows: firstly, a workable cluster model is impossible as long as the institutional dimension of cluster formation and functioning is ignored; secondly, in the market-oriented (competitive) socio-economic context sustainable clusters of non-innovative type cannot be viable.

Here, **clusters** are defined as localized meso-economic systems with fuzzy borders, consisting of interconnected heterogeneous agents and specific local institutions determining the roles of these agents and stimulating innovative development of these systems.

In order to characterize the elements of the instrumental definition of the cluster and the imposed restrictions [6] we suggest putting clusters in an appropriate (institutional) context; review the existing approaches to cluster identification; reveal their limitations, and outline the methodology of innovative cluster research.

The concept of institution needs clarification in the context of economic system. We take institutions as *perceptions* of the role of agents in social system. Therefore, institutions are not exclusively viewed as external or exogenic factors perform the role of 'the rule of the game', or yet that of mechanisms forcing the agents to abide by the system. Although the concrete manifestations of institutions can be deduced through analysis, it mainly concerns formal North-esque institutions. With the definition of the institution being vague and ambiguous (see Markusen — Lagendijk debate)[1], the borders of social systems described through the concept of the institution will remain

[1] For further details see: [3].

blurred. Such fuzziness, however, should be preferred to multiple attempts to classify the variety of mesoeconomic systems in the geo-industrial perspective, vague as it is.

The existing *perceptions* based on the stimulus-reaction type and behavioural characteristics of agents (their perception of each other) determine the *complexity* [39, p.1] of the social system, including the cluster.

Lastly, the mesoeconomic system is viewed here as a system of economic agents functioning as vehicles of specific institutions. Following the evolutionists, we consider the meso-level as an institutional ecosystem thus restraining the technological (industrial) basis for classification.

Thus the concept of cluster (as well as of any economic system falling between micro- and macro-levels) is viewed as, and analysed according to, the intensity of three factors: local (geographical), industrial (technological), and institutional. Such an approach is seldom implemented in full because of its complexity. In other words, the approach could be summed up in this way: the institutions are important, but the ways they are mounted into the system are still more important.

Induction and fuzzy definitions as a basis for the descriptive theory of clusters

The section of regional economy dealing with localized economic systems (A. Marshall is assumed to be the founder of the theory) is developing in cycles and is prone to vicissitudes of fashion for terms and concepts. The above does not mean that these systems are not given to changes — on the contrary, as a rule, researchers use an inductive approach to track these changes; further, and they attempt to design a theory that could justify the changes embracing a wide range of phenomena. At the next stage of formalization the new theory abandons its initial specific features, which eventually leads either to a theoretical reduction or to its political escalation, in practice resulting in profanation[2].

Whatever conventional a split, many theories of spatial development are known to have been conceived *inductively* (for overview see [2]). This approach could be illustrated by the basics of the theory of industrial districts by A. Marshall and the growth pole theory by F. Perroux. The Standort theories of I. von Thünen or A. Weber, who relied more on deduction, could be viewed as counter-illustrative. It was the Soviet school of economic-geo-

[2] In [8, p. 698]: “Regarding the network structure development in Russia, one cannot overlook the urge, traditionally inherent ... in the bureaucracy, to substitute the core of the issue with its profanation. Thus it cannot be ruled out that reports on the forming... of such network structures as clusters, or on the need to do so may hide the desire to get the 'bureaucratic rent' – realistic or potential benefits from clusterization”.

graphical location of production forces (N. Baransky, A. Granberg, et al.) that claimed the deductive (alias scientific) approach to the territorial organization of production. An important feature of the deductive approach is use of the methodology of economic-mathematical modelling, primarily the aggregation and input-output model and systemic approach to the planning of territorial complexes (TIC).

Now viewed as traditional, the theory of industrial clusters whose forbearer[3] and promoter[4] was M. Porter [12, c. 205—292], formed as an inductive theory. In his classical work M. Porter maintains:

"Geographic concentration magnifies the *power of domestic rivalry* (Emphasis added — T. G.). This pattern is *amazingly* common around the world... the more localized the rivalry, the more intense. And the more intense, the better".

Ironically, it is also vigorous *domestic* competition within the *state* that ultimately pressures domestic companies to look at global markets and toughens them to succeed in them [11, p. 564].

The methods of quantitative assessment of clustering on the interregional level (USA economy used as an example) claiming the scope of deductive generalization is quoted in Porter [12].

We maintain that ***the influence of induction*** on cluster theory leads to the repercussions as follows:

1. The principal fuzziness of the definition of cluster proceeding from the fuzziness of the underlying concepts ("How do I know the cluster when I see it?") [30]).

2. The subjective (normative political, or, more precisely, axiological) approach to the concept of cluster as a preferred type of meso-economic system reflecting the conflicting traits of the globally dominant socio-economic system.

As a result, *two approaches* to defining clusters become apparent. The first one treats the cluster as a generic notion, i. e. *a type* of local economic systems normative-wise, enjoying the preferred quality of increased competitiveness. In the second case, the cluster is viewed as a specific concept for all types of local production systems; hence different systems are regarded as clusters of different types.

[3] However, the concept *cluster* had featured in publications before M. Porter, which the latter admits.

[4]The issue of popularization of inductive theories is noteworthy. In the contemporary economic theory, one has to possess unique leadership qualities in research for this kind of theory (descriptive by nature, as a rule) to win any serious attention. In this case, broad practical interest to theoretical advancement has most likely played its role, alongside the ideological vacuum the 80-s witnessed. M. Porter wrote: "We need a new perspective and new tools — an approach to competitiveness that grows out of an analysis of internationalyy successful industries, without regard for traditional ideology or current intellectual fashion. We need to know, very simply, what works and why.Then we need to apply it". [11, p. 550].

We adhere to the first point of view, because in the second case the concept of cluster is equalled to a more general notion of local production (economic) system thus rendering the very concept of 'cluster' identical with the concept of 'grouping' and therefore pointless for analysis. For the institutional approach it is the matter of principle. According to A. Shastitko, "applying different approaches to the analysis of the same subject may appear useful for demonstrating the similarities and differences in methods; however, it can hardly yield any unambiguous operational conclusions as to the nature and forms of clusters, and their possible ways of development" [13].

It is of importance that once clusters are logically differentiated from non-clusters, they are further subdivided into types of clusters. Given the fuzziness of definitions, there is always a risk to treat a non-cluster as a type of cluster. There is also another risk of singling out Italianate districts as specific, pertaining exclusively to Italy, industrial systems, which should not be referred to as clusters (we do not share this point of view). We maintain that, alongside the geographical proximity principle, it is the institutional dimension that underlies the division into clusters and non-clusters. Technological relatedness (industrial profile) or economic efficiency permits a more precise identification of types of meso-economic systems.

Common inductive features of clusters

Inductively, like all other local production systems, clusters consist of multiple juridically independent inter-related agents forming groups and coalitions and various hybrid coordination forms. To tell clusters from other local systems, they are *inductively* ascribed a set of features typical of more *successful* economic systems of the given period (as a rule, of the most competitive economies of capitalist type).

In our opinion, the better part of research (starting from Porter [11; 12]) demonstrates the approach that could be summed up in five major principles[5]:

- Firstly, the geographical *concentration* of the institutions forming the cluster profile;
- Secondly, the *competitive* basis for the general type of economic activity and c*ompetition* between companies (creation of a dynamic network of interior suppliers);
- Thirdly, *cooperation* between companies going both vertically and horizontally, alongside the formation of specialized economic and market infrastructure;
- Fourthly, common *communication* policy (information and advertising strategy) aimed at popularization of the brand;

[5] The characteristics in the table are italisized to be referred to as 5Cs: *concentration, competition, cooperation, communication, competence* (emphasis added in the table — T. G.) [1].

- Fifthly, *competence* of human resources in a specialized cluster in a given geographical area.

In other words, the concept of cluster should embrace a local production system enjoying all the above mentioned characteristics. The fuzziness and subjectivity of threshold values of multiple indices reflecting the above features create numerous methodological problems. Even with a considerable role of state in local economic systems, (the Silicon Valley phenomenon is worth mentioning here), their commercial subsystem, however, possesses all the necessary features that enable them to incessantly generate commercially successful innovations. This is why most researchers will agree that clusters are dynamic, commercially efficient competitive systems with high innovation potential even in spite of a heavy involvement of the state.

A. Shastitko [13] gives a thorough analysis of variations and groupings of the clusters' features and indicators. He draws attention to the fact that institutional features seldom feature in the characterizations of clusters and, to our knowledge; he is the first to consider clusters in the context of the new institutional economic theory (NIET)[6].

The strength of such an approach may consist in providing a more substantial theoretical basis for clusters through NIET, which views clusters as *hybrid forms of transaction coordination.* However, in our opinion, it allows a broader treatment of cluster, for hybrid cluster forms inconsistent with the traditional criteria are readily available. Nevertheless, the research methodology in the framework of institutional theoretical platform appears to be quite promising (the treatment of clusters in terms of the theory of the company or the theory of contracts).

Along with the above said, institutional comparative studies (the analysis of specific features of local systems in various institutional environments) have a great potential. Pragmatically, including institutions into cluster research may suggest that in different types of economy homonymous micro-agents and meso-structures conceal different economic implications. For example, more often than not, *special economic zones* in Eastern Europe, China, Latin America and Russia have nothing in common but the term *per se*. Another example: the attempts to abstractly single out Porter-esque clusters in the economies with state-paternalist types of constitution generally lead to the identification of the legacy of territorial-industrial complexes (TIC).

Essential for this study is the **hypothesis** that it is their institutional nature that makes it possible to foreground clusters against the backdrop of all classes of local industrial systems. The substantiation of the institutional nature of innovative clusters makes it possible to shed light on such phenomena as quasi-clusters of post-Soviet era, trans-border international clusters and many others.

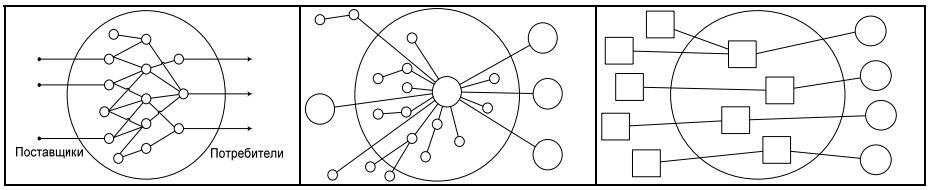
Typology of clusters: various approaches

As has been said above, cluster typology basically rests on the technological interdependence (industrial specialization and size), alongside geographical proximity of economic agents. Here we will focus on most worth-

[6] The assessment of interior and exterior institutional factors of cluster functioning with due account for the role of transaction costs and company size can be found in [6].

while typologies among many, as they give grounds for both assessing the versatility of classifications and judging the depth of research into institutional parameters.

The range of typologies is broad and versatile [7]; however, they could be reduced to the well-known typology of industrial districts by A. Markusen [30 who proposed to count, apart from the Marshal-lian districts, *hub-and-spoke* ones and satellite *platforms* (Fig. 1).



Marshal-lian districts Hub-and-spoke districts Satellite platforms

Fig. 1. Types of districts of local and non-local acceleration[7] [30, p. 297]

Terminological disagreement apart, the important feature of Markusen's typology is that the author regards local vs. non-local embeddedness of industrial groups, and attempts to take this opposition into account in the universal classification[8]. Another merit of this classification is distinguishing a new type of state-anchored districts (they do not feature in the chart above).

Although Markusen finds examples of same-type districts in different national systems, it happens because *sticky mixes* are highly recurrent. Therefore, her recommendations are aimed at expanding the role of comparative institutional analysis. In particular, this study is very critical of the fashion to use the model of "new industrial districts," particularly in relation to American economy, for which 'hub-and-spoke districts' and 'satellite platforms' are more typical.

According to L. Markov and M. Yagolnitser, E. Marcuse's typology raises questions about the effectiveness of local political initiative and various models explaining the relationship of innovation and territories [7, p. 34].

An effective typology of clusters is contained in S. Yammarino and F. McCann [26]. They note that in the framework of spacial economy three implicit abstract types of inter-firm groups have formed (Table 1).

The use of the *cluster* as a specific concept for the analysis of different meso-economic systems is an easily removable flaw in this typology; meanwhile, the typology's worth lies in the fact that it takes us back to the notion of a simple agglomeration as a typical form of meso-economic systems (especially in emerging and post-Soviet economies).

[7] Medium circle: a large-size local lead enterprise; small circle: a small-size local firm; square: subsidiary industry.

[8] For that reason Markusen regards all group types other than Italianate ones as universal, independent of national identity.

Table 1

Industry grouping[9]: transaction cost analysis

Parameter	Type of territorial grouping		
	Simple agglomerations	Industrial structures	Social networks
Size/type of firm	Atomized	Chiefly large	Various
Type of relationship	Barely traceable; fragmented; unstable trade transactions	Identifiable; frequent and stable trade transactions	Trust; loyalty; joint lobbying; joint ventures
Membership	Open type	Closed type	Semi-open type
Access to group	Rental charges; proximity obligatory	Interior investments; proximity obligatory	History; experience; proximity obligatory, if insufficient
Example	Competitive urban economy	Steelworks or chemical complexes	New industrial areas
Analytical approach	Model of pure agglomeration	Theory of location and space economy	Social Networks theory (after M. Granovetter)
Notion of space	Urbanized	Local or regional, non-urbanized	Local or regional, non-urbanized

Compiled on the basis of [26, p. 1029].

Another important feature of the typology is its singling out *industrial complexes*, which are also partially retained in resource-based and state-run economies. The combination of simple agglomerations and transformed territorial-industrial complexes can be regarded as the prototype of the local economic system of contemporary Russian economy. Including *the attitude to the rent* in the analysis is crucial, for it opens up the way to a broader institutional assumption and to a typology of economies.

It is a matter of principle for domestic researchers [9, 10] to distinguish between complexes and clusters, because otherwise the former TPC readily fit the definition of cluster (Table 2). As will be seen in the next chapter on the methodology of cluster identification, before 1980-s seminal western research did not focus on this distinction, virtually ignoring the contribution of Soviet experts [19].

From the normative and practical points of view, these differences may prove very useful in avoiding inappropriate and ineffective lobbying, which attempts to use cluster policy tools for their own purposes[10]. However, it is probably only relevant for policy makers and researchers of transition econo-

[9] '*Clusters'* in the original; however, the term *'grouping'* is used here to distinguish between '*clusters' and 'simple agglomerations'.*

[10] The case of the Kaliningrad region, which we are best familiar with, demonstrates how industrial groups were time and again proclaimed clusters; however, eventually they proved unsustainable.

mies. In our opinion, a more relevant question for transition economies is whether the formation of clusters based on the transformation of TPCs is possible in principle, and whether such transformations could be carried out without the participation of leading multinational corporations (MNCs).

Table 2

Principal differences in territorial-industrial complexes

Factor	Cluster	TIC
The principal socio-economic system	Market type	State planning economy
1. Genesis	Profit maximunazation of revenue and freedom to choose the investment place	Minimization of losses and cost-effective distribution of resources
2. Location	Formerly developed densely-populated areas, commonly within an agglomeration	Developing areas, often with low population density and adverse climatic conditions
3. Structure	The nucleus is the accumulation of independent companies in one industry or branch	The nucleus is comprised of the basic group industries within an inter-industrial complex
4. Industry specialization	Consumer-oriented industries	Producer-oriented industries
5. The role of information exchange	Information exchange all the way down through to the formation of the horizontal networks	Information exchange in the framework of the set top-down vertical plans
6. Role of human capital	Profession-oriented specialists placed in privileged conditions	Human resources are one of the production factors alongside natural resources and infrastructure
Objectives and methodology of research (given the similarity of mathematical apparatus)	Inductive approach in competitive context	Deductive approach in non-competitive context

Based on: [9; 10].

The role of transnational corporations in the formation of clusters quite surprisingly appears to be one of the unexplored aspects, and not for transition economies alone (ironically, nowadays they provide experimental fidelity in mezo-economics).

Experts on transnational corporations highlight the institutional factor in cluster development more clearly, as the clash of TNCs with the institutional environment is easier to document [28]. By and large, the "structural" imperfections of the market were, in fact, the first topics on the neo-institutional agenda. In the diagram (Fig. 2), symmetric and asymmetric types of the cluster just characterize the type of oligopoly underlying the cluster core. In particular, the asymmetric cluster requires a dominant leader [38].

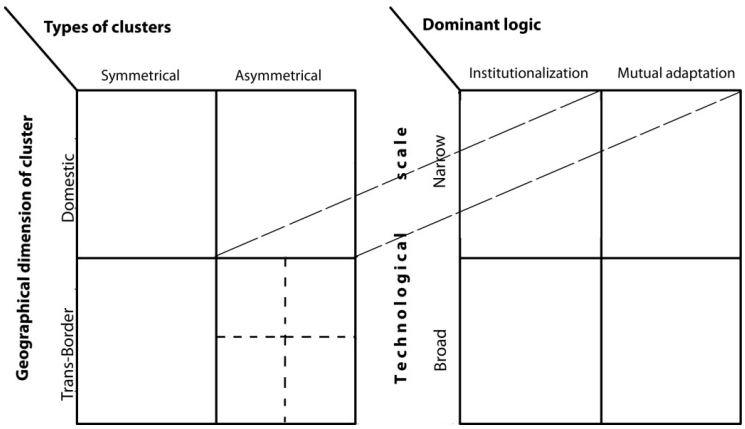


Fig. 2. Cluster types viewed through the participation of TNCs [38]

This classification [38] stresses the institutional role of TNCs, but the term "cross-border cluster" is used to describe their international engagement in a broader sense, beyond cross-border relations. It is noteworthy that E. Markusen also pays considerable attention to the role of international actors (especially in the satellite platforms model); however, for her, industrial platforms characterize the model of global outsourcing, which is inherently closer to the model of agglomeration or a complex.

Another important property of clusters is their innovative nature. A. Lagendiyk's graph represents the family of "territorial innovation models" (TIM) (Fig. 3), whose development marks a shift from "interest from spatial and economic contradictions and class-struggle to knowledge-based competitiveness, and to associational approaches, with growing interest to the social and institutional underpinning of the "economic" [27, p. 722].

TIM synthesis of the models of regional *innovative* development "in which *local institutional* d*ynamics* plays a significant role" [34, p. 291]. In our opinion, the term *local production systems (LPS)*[11] is more appropriate as a generalizing concept to form typologies; however, this aspect can be the subject of a separate discussion. It is noteworthy that TIM have been developing since the late 1980's, therefore the researchers are primarily interested in the *innovative types* of local systems (often a technocratic approach to innovations is prevailing, and endogenous sources of competitiveness are considered)[12]. Conceptual models of regional economy have often been criticized for their economic determinism and a tendency to "quickly create a theory".

[11] In spite of its recurrence, the term *LPS* (Fr. — *SPL*) does not enjoy any authorozed interpretation (probably due to the vagueness of rather general terms *local* and *system*). Therefore, there is a possiblity to use the term ***local economic system*** to describe various meso-level economic systems relating to the regional science (another branch of meso-economic systems deals with the objects of the theory of industrial markets). In our view, it is a convinient term, because at the macrolevel the accepted term is 'economic systems', (in terms of economic comparative studies), while on micro-level economic systems are firms.

[12] The transition from exogenous to endogenous sources of competitiveness is often characterized as the transition from the *top-down* to the *bottom-up development* model.

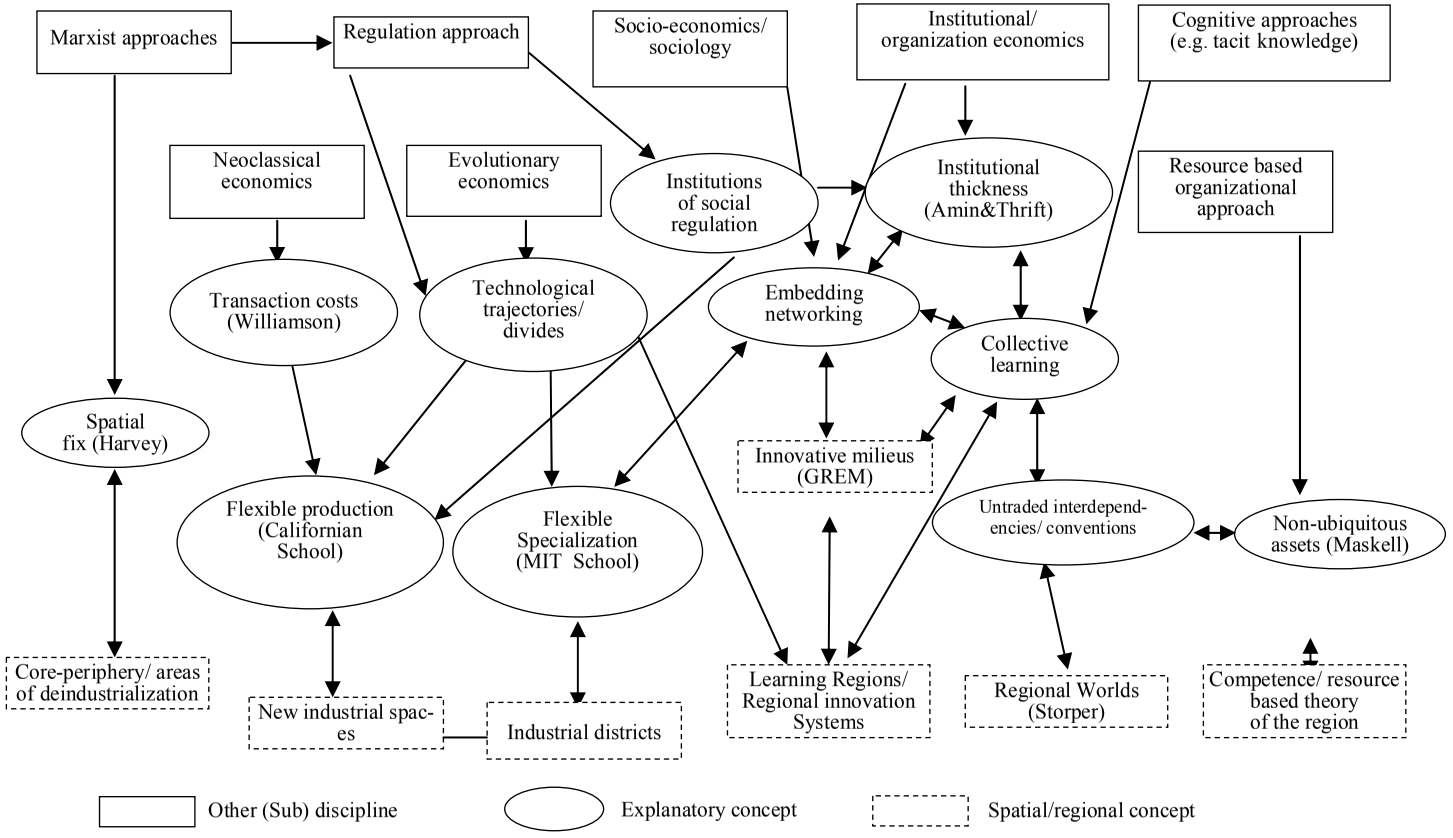


Fig. 3. Territorial Innovative Models (TIM) [27, p. 722]

Part of the cluster theory criticism derives from the fuzziness of the geographical dimension [32] underlying this or that theory. As shown in the TIM pattern, many of these concepts are hardly identifiable in terms of dimension. The traditional theory of clusters faces the same problem.

More often than not, the concept of geographical ***proximity*** is blurred; however, this concept actually distinguishes the cluster from network analysis[13].

R. Boshma argues that, firstly, for economies' functioning various forms of proximity are of importance (geographical *proximity* not being a defining form); and secondly, there are problems of *excessive* proximity, which are manifested in a variety of lock-ins and can hinder innovation [17]. Geographical (spatial) proximity is considered by them as a complementary factor in the formation of organizational, social, institutional and finally, cognitive proximity (Table 3).

Table 3

Proximity forms, acc. to R. Bomche [17, p. 71]

Forms of proximity	Key dimension	Lack of proximity	Excessive proximity	Possible solutions
1. Cognitive	Knowledge gap	Miscomprehension	Lack of innovation sources	Common knowledge base with different, if complementary capabilities
2. Organizational	Control	Opportunism	Bureaucracy	Loosely connected systems
3. Social	Trust based on social relations	Opportunism	Lack of economic justification	Blend of traditional and market relations
4. Institutional	Trust based on common institutions	Opportunism	Blocking an inertia	Institutional audit and balancing
5. Geographical	Distance	Absence of external spacial effects	Lack of geographical openness	Blend of local and external connections

Discussing the role of institutional factors, R. Boshma actually means the aggregate of organizational, social and institutional proper ones in the core sense of the word "proximity" [17, p. 68]. The organizational aspect assumes the established perceptions and beliefs of the level of opportunism and the need for control. The social aspect reflects primarily informal relationships between agents at the micro-level, i. e. the level of trust, on which the quality of communication depends (willingness to share implicit knowledge). The North-esque institutional dimension characterizes the institutional environment on the macro-level (codes of conduct).

[13] A. Shastitko [13] furthers the cluster analysis arguing that being hybrid coordination mechanisms, networks form the basis of cluster. In other words, the cluster is viewed as a variety of hybrid institutional agreement.

However, as we can see, even the most successful modern typologies of clusters (and local production systems) are based primarily on geographical and technological principles of classification, and only in rare cases a separate institutional component is highlighted.

As geographical proximity is rather a trivial (if by far not unambiguous) factor, the vast majority of existing technical approaches to the identification of clusters is based on the analysis of technological links.

Cluster analysis has been far from a new topic in research since the post-war years. To quote a landmark review of the work by Chamanski S. and L. Ablasa on the identification of clusters and complexes, this to this day has not lost its relevance [19, p. 62]:

Considerable confusion exists in the literature concerning the related concepts of industrial clusters, industrial complex, growth pole and growth centres and central locations. <...> the cluster means a subset of industries linked by the more powerful flows of goods and services are than those (flows) linking them to other sectors of the national economy.

According to Chama ski S. and L. Balsa's take on clusters, the latter are devoid of geographic (spatial) dimensions. It is noteworthy that in the research literature, this view of the cluster is very common, as it most readily lends itself to quantified analysis [14]. More precisely, the spatial dimension, as it were, is present by the level of aggregation (of geographical dimension), for which a corresponding table of the MPS is compiled (as a rule, it is the level of a country)[14].

Local production systems "suspected" of belonging to clusters are usually selected on the basis of the analysis of the above normal employment by the sector, as well as the correlation between sectors, based on MPS. Since the scope of this article does not allow us to consider the diversity of methods for the identification of clusters, here in Table 4 we present only the general approaches, each consisting of many individual techniques and combinations. Some of them may partially solve the fundamental problem of taking into account the barely formalizable and measurable parameters, but so far they have not been applied to Russian economy (probably due to the lack of a reliable MRD base).

Table 4

Methodological approaches to cluster identification

Method	Level/object	Advantages	Disadvantages
Expert poll	Micro/firms	Cost effectiveness and universality	Generalization hurdles
(*LQ*)	Meso- sectors	Simple, universal	To be applied alongside other methods
(MSQA)*	Meso- sectors	Simplicity	Partial loss of information

[14] Foreign literature offers an extensive gamut of methodology for claster identification. See: [16; 20; 22; 24; 35 et.al.].

End of table 4

Method	Level/object	Advantages	Disadvantages
IO on material flows	Meso- sectors	Main source of detailed data	Dated data; preset choice of sectors
(*IO*) on tangible flows	Meso- or micro-sectors or firms	Theoretical justification	High requirements to data
Graph theory / network analysis (*NA*)	Meso or micro-sectors or firms	Visualisation	Abstraction
(Q-analysis)*	Meso or micro-sectors or firms	Universality and user-friendly analysis	Partial loss of information
(*MAS*)*	Micro-firms	Control over complexity	High level of abstraction
Fuzzy clusters*	Meso-sectors	Flexibility; conceptual justification	Problems with data selection
Special examination	Meso or micro-sectors or firms	Flexibility, pragmatism	Expensiveness; resource-intensiveness
* Correlation-regressive analysis	Meso or micro-sectors or firms	Universality; variety of modifications	Problems with generalizations; faulty connections

Obviously, Porter was familiar with the literature, in which clusters and complexes were analysed at the industry level; therefore he chose the concept of cluster reflecting the phenomenon of geographical concentration of the most successful companies in the framework of the "diamond of national competitive advantage."

Conceptually, Porter's take on clusters has two main distinctive features: first, clusters, although considered at the industry level, are, in fact, disaggregated to the level of firms and organizations, and secondly, in spite of being tools for national competitiveness, clusters are localized on the regional level (actually, confined to the area covered by several nearby agglomerations). The presence of an oligopolistic structure serves as prerequisite for this analysis, the central focus on the competitiveness of intercompany cluster chains being its result. This approach corresponds well with the level of regional policy, which allowed Porter and his followers to deploy the "Harvard" project on clusters and competitiveness. The enhanced vagueness of the concept of cluster, for which it is subjected to criticism in scholarly literature, is, however, the downside of the otherwise popular Harvard approach[15]. This is not surprising, since Porter's concep-

[15] For that matter, such critisism is no news. M. Enright gives a detailed systematization of its argumentation by considering clusters in the context of various geographical dimensions and business life cycles. Thus he suggests five characterizations of clusters: working, latent, potential, policy driven and 'wishful thinking' ones. Graduating clusters in time and space turns them into a general concept for meso-economic systems. Hence, the degree of maturity of the cluster is therefore directly dependent on the density and pattern of the networks defining it. Besides, M. Enright's analysis raises the major issue of role of MNC in the formation of regional clusters [23].

tual course went contrary to the rather long tradition of quantitative analysis of complexes and clusters based on the MPS, but met the needs of polititians.

In response to the criticism on the lack of quantitative methods and abuse of fuzzy concepts, Porter developed a method for the quantitative identification of clusters in several stages. According to Porter, regional economies are comprised of three types of sectors (Table 5). He draws a boundary between clusters and other types of meso-economic systems as follows [37].

Table 5

M. Porter's classification of economic sectors (proportions for the U.S., 1996)

Indicator	Sector type		
	Traded	Resource-driven	Local
Number of SIC industries			
Including producing ones	590	241	48
Commodities	441	7	37
Services	149	234	11
Share of Employment in Private Sector,%	31,8	67,4	0,8
Patents per 10,000 Employees	21,1	1,3	7,0

Inspired by: [37, p. 559—560].

According to Porter, clusters differ from the model of global outsourcing and vertical integration. Obviously, Porter recommends focusing on the segment of tradable (export) goods, within which traded clusters are formed, since they are the drivers of growth, productivity and innovation.

Harvard-style cluster analysis is most common on micro-level and, as a rule, is formalized in case studies. This method of accumulating empirical evidence apparently inherits all the weaknesses of phenomenological approach; it is not immune to mistakes of types I and II; however, against the background of initial vagueness of the theory, it is consistent with the practical needs of the regional policy.

Here again we are faced with a typical trap in cluster studies — the gap between the conceptual framework of clusters on micro- and macro levels and quantitative methods of their identification on meso- and macro-levels. Quantitative methods are chiefly based on the correlational analysis of "input — output" tables and the subsequent data processing with the use of statistical factor analysis.

Institutional variables of clustering

It is appropriate to characterize any localized economic system by three enlarged factors: localization, technological level and institutions. Each factor may be composed of a complex combination of variables. Moreover, as

has been shown in [17], the variables can influence each other both positively and negatively (Table 6). It is the negative correlations that are significantly underestimated (it is noteworthy that the exclusion of institutions from the analysis reduces the number of possible combinations) [6].

Table 6

Factors of clustering

Projection of Cluster	Localization	Technology	Institutions
Localization		—	—
Technology	+		—
Institutions	+	+	

Note: this matrix is formed of two symmetrical matrices.

Table 7 shows the possible interpretation of the institutional factor. In our opinion, in a dense network of institutional levels, there are configurations confirming the possibility of cluster formation in our interpretation.

Table 7

Conditions for Cluster Formation from the Institutional Point of View

Level of institution	Institution type	Characterization of the environment for innovative cluster formation
Meta- institutions	Collective perceptions of technological level of the nation and quality of its resources	Agents believe that their products, organizations and themselves could be best in the world
	State of empathy in society: agents' stereotypes and policies towards each other	A high empathy level stimulating cooperative behavior
Formalized national institutions	Legislation protects property rights	Highly developed legislation, law-enforcement practice and judicial defence
Non-formalized national institutions	Division of power and property; level of corruption	Moderate corruption level in the context of historical specificity and evolution of market relations
Formalized local institutions	Specific stimulating legislation and regional state-guaranteed order	Risk of stimuli distortion (possible at early stages)
Non-formalized local institutions	Level of trust and mutual exchange of specific knowledge	Level of trust sufficient for mutual exchange of specific innovation-stimulating knowledge
Locally specific institutions	Role of local reputation	Loss of reputation is tantamount to loss of business (or profession)

In our classification, meta-institutions reflect the influence of old institutional traditions and relate to cultural studies (least formalizable) variables.

The concept of "formalizability" of institutions shows the ability of agents at least to roughly assess the balance of costs and benefits from the use of this institution. As a rule, the agents have an adequate understanding of the direct action law (especially when it comes to precise quantitative criteria of encumbrance and sanctions). It is more difficult to determine the impact of formalized rules (for example, in respect of corruption rent when necessary resources are allocated), as results from a higher level of uncertainty.

There exists quite an extensive literature devoted to the study of internal, locally specific institutions that form within clusters. Among the *institutional* variables of local cluster development the concepts of ***cooperation and partnership [trust]*** [34, p. 291] are most recurrent. It is the presence of such locally specific institutions that, in our view, makes it possible to correctly identify the cluster in agreement with the suggested definition. Examples of such institutions could be found in the forms of trust in contractual relations between firms, local business reputation, vision of professional standards, the collective perception of the role of authorities and other organizations [6].

The proposed scheme suggests that the localized meso-economic systems evolutionize from simple agglomeration to innovation clusters with cross-border participation. Favourable state and institutional metainstitutions and those of national level provide conditions for their formation. Moreover, for simple agglomerations institutional and technological dimensions are usually not crucial (for business *networks*, it is localization that is not a matter of principle) If the conditions are met, the presence of a cluster can be confirmed by the presence of locally-specific institutions.

In general, ""“Thus, it is implied that the understanding of institutions, which at present revolves to a large extent around *single-typed* and *single-level* units, needs to be developed further towards *multi-level* and *multi-unit* phenomena” (Emphasis added — T. G.) [39, p. 5].

Instead of a conclusion

In the context of cluster studies two major positive tasks come forth: the identification and modelling of clusters. Normative-wise, there is a twofold challenge: promotion and formation of clusters.

At its present stage, the theory’s attempts of modelling lead to the emasculation of essentially "fuzzy" definition of cluster. In our view, this issue is related to the difficulty of formalization of *institutions* which earmark clusters among other types of local economies[16]. Available models, as a rule, can

[16] Perhaps the problem has deeper philosophical, methodological and historical roots, and it is thanks to it that the theory of deployment (regional economy) found itself on the periphery of theoretical economics. The economic theory tends to study "pure classes", while the regional economy is primarily designed to examine specific examples of their implementation, which hampers generalization.

identify technological forms of exchange on the basis of aggregate data (sometimes intangible), and estimate the localization coefficients; however, they are ineffectual in the analysis of aggregate institutionalized factors.

The traditional approach to the understanding of clusters is based on the theory of competitiveness and the national level of aggregation of economic data. Most of the acknowledged cluster typologies have been elaborated for developed capitalist economies (of liberal, socio-corporate or corporate-paternalistic type) [5, p. 101—102].

That entails the question whether the complexity of economic, social an institutional factors and processes that explain the dynamics of clusters can be reduced to the concept of competitiveness. [32, p. 14]

The purpose of developing the theory and methodology of cluster identification consists in introducing an *institutional dimension* to the geographic and technological approaches in the cluster characterization [6].

The *basic hypothesis* is that not every social and economic system allows the creation of mesa-economic systems that meet the accepted definition of the cluster. The strong assertion is that the main feature of cluster formation is the presence of locally specific *institutions formed* by the clusters.

This approach, in our view, can, on the one hand, explain the possibility of cross-border clusters, (Medicon Valley, for example); on the other hand, it makes it clear why there is no qualitative cluster formation in transitive post-Soviet economies and accounts for the role of transnational corporations in the development of clusters.

References

1. Gareev, T. R. 2007, «Voshodjawie» modeli regional'nogo razvitija, lokal'nye proizvodstvennye sistemy i razvitie malogo i srednego biznesa [«Rising» model of regional development, local production systems and development of small and medium businesses]. In: *Kaliningradskaja oblast': na puti k regional'nym programmam MBA/MPA* [Kaliningrad region: towards regional programs MBA / MPA], Kaliningrad, Izd-vo RGU im. I. Kanta, p. 76—113.

2. Gareev, T. R. 2010, Instituty i jekonomicheskoe razvitie na subregional'nom (mezo-) urovne [Institutions and economic development at the subregional (meso) level], *Obwestvennye nauki i sovremennost'* [Social Sciences and the present], no. 5, p. 45—58.

3. Gareev, T. R. 2010, Regional'nyj institucionalizm: terra incognita ili terra ficta? [Regional institutionalism: terra incognita or terra ficta? *Journal of Institutional Studies,* Vol. 2, no. 2, p. 27—37.

4. Kutsenko, E. S. 2009, Klastery v jekonomike: praktika vyjavlenija. Obobwenie zarubezhnogo opyta [Clusters in the economy: the practice of identification. Generalization of international experience], *Obozrevatel' — Observer*, no. 10 (237), p. 109—126.

5. Levin, S. N. 2007, *Formirovanie konstitucionnyh pravil v jekonomike Rossii* [The formation of the constitutional rules in the Russian economy], Kemerovo, Kuzbassvuzizdat.

6. Markov, L. S. 2010, Institucional'nye aspekty funkcionirovanija innovacionnogo klastera [Institutional aspects of the innovation cluster], *Menedzhment innovacij [Management of innovation],* no. 4.

7. Markov, L. S., Yagolnitser, M. A. 2008, Mezojekonomicheskie sistemy: problemy tipologii [Mesoeconomic system: problems of typology], *Region: jekonomika i sociologija* [Region: Economics and Sociology], no. 1, p. 18—44.

8. *Mezojekonomika razvitija [Mezoekonomika development],* 2011, CJeMI RAN, Moscow, Nauka.

9. Pilipenko, I. V. 2011, *Klastery i territorial'no-proizvodstvennye kompleksy v regional'nom razvitii, Regional'noe razvitie i regional'naja politika Rossii v perehodnyj period* [Clusters and territorial-industrial complexes in regional development, regional development and regional policy in Russia during the transition period], Moscow, Izd-vo MGTU im. N. Je. Baumana, p. 191—208.

10. Pilipenko, I. V. 2004, Principial'nye razlichija v koncepcii promyshlennyh klasterov i territorial'no-proizvodstvennyh kompleksov [The principal differences in the concept of industrial clusters and territorial production complexes], *Vestnik Moskovskogo Universiteta. Ser. 5, Geografija* [Moscow University Geography Bulletin], no. 5, p. 3—9.

11. Porter, M. 2006, Konkurentnye preimuwestva stran [The competitive advantages of countries]. In: *Vehi jekonomicheskoj mysli, T. 6, Mezhdunarodnaja jekonomika* [Landmarks of Economic Thought, T. 6, International Economics], Moscow, TEIS, p. 549—581.

12. Porter, M. 2003, *Konkurencija* [Competition], Moscow, Izdatel'skij dom «Vil'jams».

13. Shastitko, A. Ye. 2009, Clusters as a Form of Spatial Organisation of Economic Activity: Theory and Practical Observations, *Baltic Region,* no. 2, p. 7—25. doi: 10.5922/2079-8555-2009-2-2.

14. Bergman, E., Feser, E. 1999, *Industrial and Regional Clusters: Concepts and Comparative Applications*, Morgantown, Regional Research Institute, West Virginia University.

15. Berry, B. 1964, Approaches to regional analysis: A synthesis, *Annals of the Association of American Geographers*, no. 54, p. 2—11.

16. Brachert, M., Titze, M., Kubis, A. 2011, Identifying industrial clusters from a multidimensional perspective: Methodical aspects with an application to Germany, *Papers in Regional Science*, Vol. 90, no. 2, p. 419—439.

17. Boschma, R. 2005, Proximity and Innovation: A Critical Assessment, *Regional Studies*, Vol. 39 (1), p. 61—74.

18. Potter J., Miranda, G. (ed). 2009, Clusters, Innovation and Entrepreneurship, *OECD*.

19. Czamanski, S., Ablas, L. 1979, Identification of Industrial Clusters and Complexes: a Comparison of Methods and Findings, *Urban Studies*, no. 16, p. 61—80.

20. Diaz, B., Moniche, L., Morillas, A. 2006, A Fuzzy Clustering Approach to the Key Sectors of the Spanish Economy, *Economic Systems Research*, Vol. 18, no. 3, p. 299—318.

21. Diaz, B., Morillas, A. 2008, Robust Statistics and Fuzzy Industrial Clustering. In: *Forging the New Frontiers: Fuzzy Pioneers II,* Springer-Verlag, p. 219 —236.

22. Dridi, Ch., Hewings, G. 2003, Sectors associations and similarities in input-output systems: An application of dual scaling and fuzzy logic to Canada and the United States, *The Annals of Regional Science*, no. 37, p. 629—656.

23. Enright, M. 2000, Regional clusters and multinational enterprises: Independence, dependence or interdependence? *International Studies of Management and Organization*, no. 30(2), p. 114—138.

24. Feser, E. J., 2000, Bergman E. M. National Industry Cluster Templates: A Framework for Regional Cluster Analysis, *Regional Studies*, no. 34.1, p. 1—20.

25. Feser, E., Renski, H., Goldstein, H. 2008, Clusters and Economic Development Outcomes: An Analysis of the Link between Clustering and Industry Growth, *Economic Development Quarterly*, no. 22, p. 324—344.

26. Iammarino, S., McCann, Ph. 2006, The structure and evolution of industrial clusters: Transactions, technology and knowledge spillovers, Research Policy, Vol. 35 (7), p. 1018—1036.

27. Lagendijk, A. 2003, Towards Conceptual Quality in Regional Studies: The Need for Subtle Critique — A Response to Markusen, *Regional Studies*, Vol. 37 (6—7), p. 719—727.

28. Manning, S. 2008, Customizing Clusters: On the Role of Western Multinational Corporations in the Formation of Science and Engineering Clusters in Emerging Economies, *Economic Development Quarterly*,Vol. 2, no. 4, p. 316—323.

29. Markusen, A. 1999, Fuzzy concepts, scanty evidence, policy distance: the case for rigour and policy relevance in critical regional studies, *Regional Studies*, no. 33(9), p. 869—884.

30. Markusen, A. 1996, Sticky places in slippery space: a typology of industrial districts, *Economic Geography*,Vol. 72 (3), p. 293—313.

31. Martin, P., Mayer, T., Mayneris, F. 2011, Public support to clusters: a firm level study of French «Local Productive Systems», *Regional Science and Urban Economics*, no. 41, p. 108—123.

32. Martin, R., Sunley, P. 2003, Deconstructing clusters: chaotic concepts or policy panacea? *Journal of Economic Geography*, no. 3, p. 5—35.

33. Morillas, A., Robles, L., Diaz, B. 2011, I-O coefficients importance: a fuzzy logic approach, *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*,Vol. 19, no. 6, p. 1013−1031.

34. Moulaert, F., Sekia, F. 2003,Territorial innovation models: a critical survey, *Regional Studies,* Vol. 37(3), p. 289—302.

35. Oksanen, E., Williams, J. 1992, An Alternative Factor-analytic Approach to Aggregation of Input—Output Tables, *Econiomic Systems Research*, no. 4(3), p. 245—256.

36. Pickernell, D., Rowe, P., Christie, M., Brooksbank, D. 2007, Developing a Framework for Network and Cluster Identification for Use in Economic Development Policy-Making, *Entrepreneurship and Regional Development*, no. 19, p. 339—358.

37. Porter, M. 2003, The Economic Performance of Regions, *Regional Studies*, Vol. 37, no. 6—7, p. 549—578.

38. Rugman, A., Verbeke, A. 2003, Multinational Enterprises and Clusters: An Organizing Framework, *MIR: Management International Review,*Vol. 43, no. 3, p. 151—169.

39. Schenk, K.-E. 2003, *Economic institutions and complexity: structures, interactions, and emergent Properties*, Edward Elgar Publishing Limited.

40. Sonis, M., Hewings, J., Guo, D. 2008, Industrial clusters in the input—output economic system. In: *Handbook of Research on Cluster Theory*, Edward Elgar, p. 153—168.

41. Steiner, M., Hartmann, C. 2006, Organizational learning in clusters: A case study on material and immaterial dimensions of cooperation, *Regional Studies*, Vol. 40, p. 493—506.

42. Sweeney, S., Feser, E. 1998, Plant size and clustering of manufacturing activity, *Geographical Analysis*, Vol. 30, no. 1, p. 45—64.

43. Titze, M., Brachert, M., Kubis, A. 2011, The Identification of Regional Industrial Clusters Using Qualitative Input—Output Analysis (QIOA), *Regional Studies*, Vol. 45, no. 1, p. 89—102.

44. Vishvanath, A., Chen, H. 2006, Technology Clusters: Using Multidimensional Scaling to Evaluate and Structure Technology Clusters, *Journal Of The American Society For Information Science And Technology*, no. 57(11), p. 1451—1460.

45. Yang, G., Stough, R., Haynes, K. 2008, Spatial and functional clustering: a comparative analysis of the Baltimore and Washington DC metropolitan regions in the US. In: *Handbook of Research on Innovation and Clusters: Cases and Policies*, Edward Elgar, p. 343—358.

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